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ABSTRACT

Problems such as poor test performance and low student motivation require that those in the educational system seriously consider restructuring the way they teach. For many years, content has been taught in periods of isolated time units; however, this Carnegie unit is an anachronism that needs to be eliminated. The alternative to the Carnegie unit assembly-line mentality for delivering knowledge and skills through completely isolated content areas is an interdisciplinary curriculum. The concept of interdisciplinary curriculum has a long history in American education. An interdisciplinary curriculum provides the needed patterns and connections for more complex reasoning and enhanced learning by meshing knowledge, skills, and information from a variety of disciplines. Classroom environment, content standards, and assessment are essential components in developing an interdisciplinary curriculum. Themes, issues, topics, or problems are necessary for structuring this type of curriculum. Some practitioners have suggested a continuum for interdisciplinary curricula that starts at the simplest level, called variously meta- or multi-disciplinary, moves through interdisciplinary, and culminates with transdisciplinary. The Mid-continent Regional Educational Laboratory (McREL) has developed a unique process for guiding teachers through the development and implementation of an interdisciplinary curriculum; the result of this process has been called a "chunk." The chunk process rests on three components: (1) learner-centered principles; (2) content and learner standards; and (3) assessment. A chosen theme serves as the organizing center of the chunk. (Contains 14 references.) (AS)

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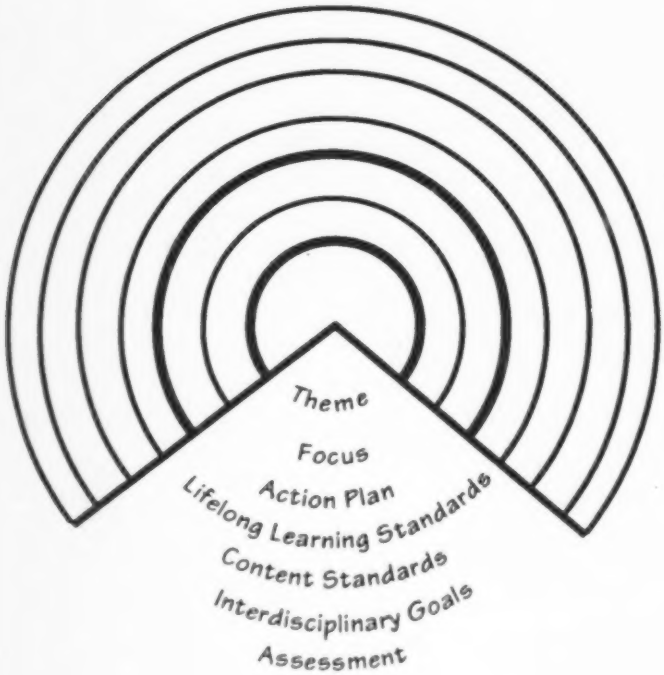

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Interdisciplinary Curriculum: A Fusion of Reform Ideas

Joan Butterworth Grady, Ph.D.

As we approach the 21st century, concerns regarding K-12 education in the United States increase. Business claims that students are unprepared for the work place. Academicians claim poor student performance on international tests is evidence of poor education. For the classroom teacher and the local school, these concerns register but occur concurrently with concerns for students' and in some cases even teachers', health and safety. In addition, educators are faced with a proliferation of mandates from federal and state governments about what must be taught and added to the curriculum. Teachers face ever burgeoning knowledge and information in their content areas. A significant issue in today's classrooms is motivation. The web of gangs, drugs and crime saps many students' interest in their education. Other students spend incredible amounts of time watching television, playing video games and communicating on electronic bulletin boards. As a result, it is necessary for those involved in the educational system to seriously consider restructuring. Since there are no panaceas, schools and districts must examine their own situations and decide how best to face the various challenges. The problems listed above must be dealt with through a series of individual and informed decisions that center on curriculum, instruction and assessment.

For many years content has been taught in periods of isolated time units. This method moves students through the day in assembly-line fashion. That system worked when we were a nation that focused on manufacturing. Now, in an information society, we need to mold the minds of future citizenry in different ways to meet the needs of such a society. This can be done by rethinking what we do in schools and how we do it.

The Carnegie unit, based on a fifty-minute period for one hundred and eighty days, is an anachronism that needs to be eliminated. This unit, upon which most graduation requirements are based, is the dictator of most high school schedules. Today's students have shorter attention spans than those of the past and seem to lack motivation for education. The alternative to the Carnegie unit assembly-line mentality for the delivery of knowledge and

skills through completely isolated content areas' methodologies is through integrated or interdisciplinary curriculum. This concept is not new since interdisciplinary curriculum has a long history in American education. "In the 1920s the Social Science Research Council was established to promote integration across disciplines that were being increasingly isolated by specialization." (Klein, 1990, p. 24). However, schools emulated the industrial model of production specialization and Carnegie units were universally accepted by the accrediting associations. This made it difficult to carry out integration of the content areas in high schools because they were almost all accredited by an association that emphasized the Carnegie unit. In 1924, Charles Alexander McMurry published a book that provided examples of interdisciplinarity in schools entitled *Teaching by Projects*. He probably did not know the word, interdisciplinarity, so he called his integrated curricula, "large project units." In it he listed three principles for projects: 1. "Combining inductive and deductive thinking in the development of essential truths," (86) — students asked questions, answered them and tested the applications of the answers. 2. "Interpretive use of acquired knowledge as a means of assimilating new and kindred topics," (87) — students synthesized ideas across the disciplines and designed solutions for identified problems. 3. "Self-activity in the independent and reflective use of language in solving new problems and in organizing the field of knowledge progressively," (88) — through projects or large units, students developed areas of personal interest and expertise and were able to demonstrate this knowledge. His principles have validity for today's integrated curriculum developers.

Projects were a direct result of Dewey's influence on education, through his emphasis on experiential learning. They were very popular in the 1920s and 30s. Later, during World War II, narrow specialization to accomplish industrial goals was emphasized. In the early 1960s Jerome Bruner emphasized discipline oriented curriculum where the structure of the curriculum became the sole organizer for the storage and retrieval of knowledge. Interdisciplinary curriculum faded away and only remained in a few light house schools. The British, on the other hand, continued to use many concepts of integrated learning in their primary schools. In the United States some isolated pockets of interdisciplinary curriculum continued in schools. It even persisted in some institutions of higher learning such as St. John's University.

An indirect boost for interdisciplinarity resulted from research on the brain by Benjamin Bloom that made it clear that lower levels of thinking, such as recall, were not sufficient for learning. Higher order, more complex thinking skills were needed. Recent brain research suggests that the brain

searches for patterns and connections as a way of making meaning. (Caine, 1991, p. 119) Interdisciplinary teaching depends on common patterns and connections that can be used by students to facilitate learning. Interdisciplinary curriculum provides the needed patterns and connections for more complex reasoning by meshing knowledge, skills and information from a variety of disciplines. Students grasp what is happening when they receive the same information and ideas in a variety of ways. The limitations created by Carnegie units have become more obvious in the present educational environment. As a result, interdisciplinary curriculum is having a resurgence. "Higher order thinking skills become a necessity as students begin to grapple with real issues and problems that transcend the boundaries of the disciplines" (Drake, 1993, p. 3).

It is necessary to have a clear understanding of what interdisciplinary curriculum is. Several prominent educators have suggested definitions. According to L. Richard Meeth (1978, p.10), "Interdisciplinary programs attempt to integrate the contributions of several disciplines to a problem, issue, or theme from life." Tschudi defined it in 1991: "Interdisciplinary learning is centered on themes or topics rather than on facts or concepts from within a discipline. It is generally focused on something of interest or importance in the real world" (p. 17). Julie Klein (1990) prefers to use another word, interdisciplinarity, to describe this type of curriculum. She states that "Interdisciplinarity is usually defined in one of the following four ways:

1. *by example*, to designate what form it assumes;
2. *by motivation*, to explain why it takes place;
3. *by principles of interaction*, to demonstrate the process of how disciplines interact; and
4. *by terminological hierarchy*, to distinguish levels of integration by using specific labels." (p. 55).

Are there any other reasons why teachers and schools should consider restructuring time, resources and talent to carry out integrated learning? The very nature of interdisciplinary work has certain attributes which enhance learning. Some of these include:

- Reinforcement and refinement of knowledge and skills.
- Student participation in coherent learning experiences.
- Unified process and content goals that are unified.
- Students confronting content and reaching higher levels of abstract thinking.

- Analytical strategies applied to a variety of contexts both in and out of school.
- Emphasis on inquiry, analysis and understanding.
- Students with responsibility for sharing their discovered knowledge and skills.
- A multisensory experience.
- Creative problem solving.
- Students integrating strategies from the classroom to the world.

Many aspects of restructuring are nested and relate to one another in myriad ways. Instruction is closely linked to curriculum and the atmosphere or environment in the classroom has a strong effect on the individual student's response, reaction and acceptance of the curriculum that is delivered. This classroom ambiance could be affected positively by setting curriculum into a learner centered environment. The American Psychological Association and the Mid-continent Regional Educational Laboratory have developed the *Learner-Centered Psychological Principles*. The document describing how their research based Principles may serve as a guideline and foundation for classroom teachers to determine whether the classroom environment they have established is effective for learning. (McCombs et al., 1993) Nor can one ignore the issues of content standards and assessment in developing curriculum. National, state or district content standards are being developed and organized and are an essential part of interdisciplinary curriculum. (Kendall and Marzano, 1994) These components can be molded together in an effective interdisciplinary curriculum development process.

As suggested by some of the definitions mentioned earlier, themes, issues, topics or problems are essential for structuring interdisciplinary curriculum. These can be selected from an endless variety of lists that have been published or that teachers have generated. The selected themes, etc., must have connectivity to the interdisciplinary curriculum developed. Certainly, they must be common to the disciplines involved. The connections sought among the disciplines should not be trivial. Themes, issues, topics or problems selected should also connect essential concepts within the involved disciplines. Other criteria may be applied which validate the selection of these foci central to the interdisciplinary curriculum developed. Some theme examples that lend themselves to interdisciplinary curriculum include: change, dependence/interdependence and patterns.

The challenge of narrowing the curriculum area by selecting an appropriate theme, requires careful consideration. Objections to interdisciplinarity must be considered and efforts made to counter the concerns and questions of those on the faculty or in the community. Teachers in interdisciplinary teams have responsibility to share the information they have learned with any constituency that might have concerns about a process which seems "different" to those who are not involved. By sharing information, educating the stakeholders and being open to questions, a group of teachers can garner support for interdisciplinary curriculum in their school and classroom.

A combination of content and, if appropriate, lifelong learner standards provides variety and meaning to the process and represents a solid basis for development of interdisciplinary curriculum. A firm foundation of instructional, motivational and learner-centered principles is important to the process and provides a foundation to build on. Through multiple validations and performance based assessment the process receives validation. Educators using an integrated approach must narrow the scope of the work and maintain rigorous academic standards. A pitfall of this type of curriculum development is a tendency to trivialize or generalize the content. Teachers well versed in their field are aware of this and make curricular decisions that avoid this problem.

Herbert Kohl listed six skills that students need if they are to learn how to function effectively and compassionately as adults. "They are the ability to:

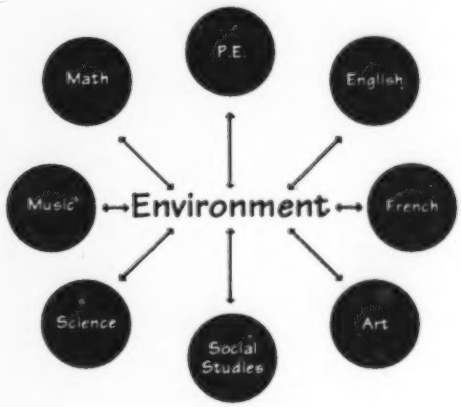
1. use language well and thoughtfully;
2. think through a problem and experiment with solutions;
3. understand scientific and technological ideas and use tools;
4. use imagination;
5. understand how people function in groups; and
6. learn how to learn something yourself.

If one agrees with Kohl that these are the essential basic skills, then interdisciplinary curriculum is a methodology that can help students gain the necessary content knowledge to support these basic skills.

Some practitioners such as Susan Drake (1993) and Heidi Hayes Jacobs (1989) have suggested a continuum for interdisciplinary curriculum that starts at the simplest level, called variously meta or multi-disciplinary, moves through interdisciplinary and culminates with transdisciplinary.

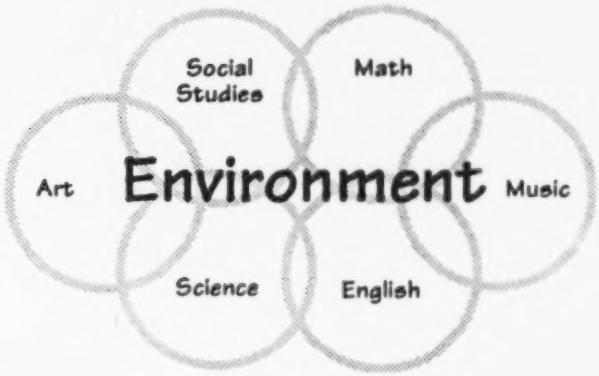
META OR MULTI-DISCIPLINARY CURRICULUM delivery occurs when teachers from a variety of disciplines agree on a single theme or topic but individually, for the most part, continue to teach students in isolation. Very little, if any, common teacher planning time occurs. Students in meta/multi-disciplinary classes know that various teachers and subjects are focusing on a single topic but there is very little connection made between the various disciplines by either the teacher or the students. In this simplistic version of interdisciplinary curriculum, teachers and students remain in their content area classrooms and deal with a single theme but only through the lens of that content area.

Meta/Multi-Disciplinary

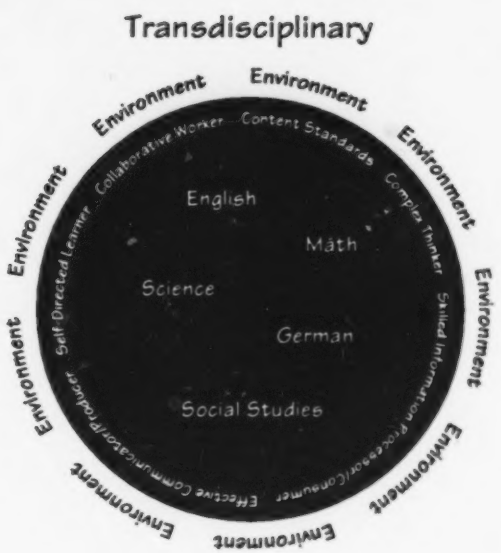


INTERDISCIPLINARY CURRICULUM presents content across the disciplines by blending teachers' approaches and students' inquiries. Students examine the topic or issue through one of many complex reasoning processes selected by the teachers who have planned the interdisciplinary curriculum. Classes are often held independently of one another with an occasional meeting of all the students and teachers involved in the process. There is considerably more planning to this version and teachers spend time after the initial design planning in meeting to provide continuity to the interdisciplinary process. It is important for teachers to hold an ongoing dialogue throughout the implementation stage to discuss successes as well as concerns related to the interdisciplinary curriculum in progress.

Interdisciplinary



A final distinction in this continuum of interdisciplinarity is that of a *TRANSDISCIPLINARY APPROACH*. It goes beyond the mastery of aspects of a single discipline or multiple disciplines, blurring the boundaries between disciplines and is the most complex to design, develop and carry out, particularly in a traditional setting. In such an approach the contribution of each of the disciplines comes into play under a common set of criteria or standards to provide a richer perspective on a given topic or event (Drake, 1993; Tschudi, 1991). The learning evolves from the integration of the disciplines within the topic, issue or problem. The interrelationships between the disciplines become part of a learning experience that has real life impact and connection. The process gives meaning and relevance to content and allows students to attain a higher level of conceptual learning than the usual level of knowledge and skills from a single subject. It is important to remember as Gardner (1994, p. 17) notes, "However, such work can only be legitimately attempted if one has already mastered at least portions of the specific disciplines." The transdisciplinary process requires preplanning, design work, and continuous interaction among the teachers and students who are involved in the process. Blocked time in the schedule is important for the transdisciplinary process to function effectively.



Regardless of where developed curriculum fits on the interdisciplinarity continuum, implementation concerns loom large. These range from the relationships of the content used to items and issues such as:

- administrative support
- school schedules and their flexibility
- available planning time for teachers
- resources
- leadership of the teacher planning team
- assessment and accountability
- parent/community acceptance
- flexibility in scheduling
- available time

Teachers involved in this process often find that some personal issues have to be dealt with including:

- their own view of the meaning of their discipline;
- anxiety and frustration from trying to "cover" and integrate content;
- conflicts that arise within the teaching team; and
- learning and teaching styles of the teachers on the team.

Once implementation and personal issues have been considered, a school needs to consider which teachers will be able to carry out an interdisciplinary curriculum. Based on the experiences of many groups of

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teachers in Canada who have designed interdisciplinary curriculum, Susan Drake (1993, p. 10) compiled a list of traits of ideal interdisciplinary teachers, they:

- volunteer
- implement the product
- love teaching and students
- are willing to learn
- are risk takers
- demonstrate interpersonal skills
- perceive the teacher as facilitator
- are generalists who "love" a specialized area
- are specialists interested in a generalized approach
- innovate and create
- have taught more than one subject
- are technologically literate

As mentioned earlier, time is a crucial element in both planning and implementing interdisciplinary curriculum. It takes time to reach consensus and compromise. Other impacts on time include: using non-traditional methods; arranging for guest speakers, field trips etc.; networking with other staff, parents and community members; adjusting to a new or different learning setting; and acquiring additional professional development to keep up with the expanding interdisciplinary education movement. A key word that helps the risk takers to move forward into the interdisciplinary arena is — flexibility.

The interdisciplinary approach is neither a subject matter nor a body of content. It is a process for achieving an integrative synthesis, a process that usually begins with a problem question, topic or issue. There are several models and processes developed to help teachers who are interested in developing interdisciplinary curriculum. Stephen Tschudi developed a model he calls "Quest" that generalizes the activities a student follows as he/she moves through the interdisciplinary process. The student chooses a topic, develops questions, participates in webbing and brainstorming, finds resources, conducts research and synthesizes and shares knowledge. Some of these activities are for individuals and others are for groups. Some involve only students and others involve both the student and the teacher. (p.44) A model, developed by Heidi Hayes Jacobs, is directed solely toward teachers and their planning for interdisciplinary curriculum. This model has four steps: selecting an organizing center, brainstorming associations, establishing guiding questions to serve as scope and sequence, and writing activities for implementation.

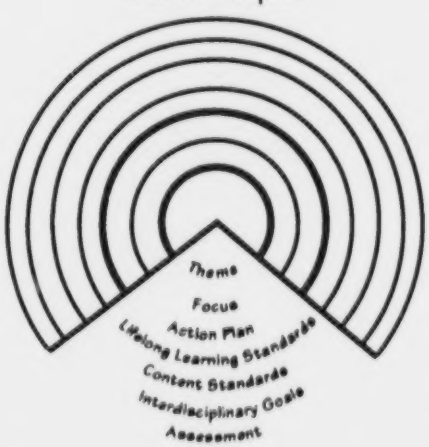
The Mid-continent Regional Educational Laboratory (McREL) has spent considerable time developing a unique interdisciplinary process. McREL examined existing models and found that many of them lacked components that were essential for effective interdisciplinary instruction and curriculum, and assessment. A model needed to be developed which integrated not only the disciplines but other facets of learning which contribute to the totality of the learning experience. With that in mind, a group of curriculum design specialists from eight states met. They have developed a unique process for guiding teachers through the development and implementation of interdisciplinary curriculum. To distinguish this work from other examples of interdisciplinary curriculum, they named the product of their process an interdisciplinary curriculum "chunk." They chose this word, previously used by Hilda Taba in some of her work related to broad based curricular units, because they wanted to distinguish this process from other types of units or resources. They also wanted to emphasize the fact that this way of looking at teaching and learning, while unique in some respects, was based on educational history and thought. The chunk covers three to six weeks of instruction, involves teachers representing three different disciplines and includes assessment of student work.

Following the development of the process, a group of 21 teachers from seven high schools from Colorado, Missouri, Nebraska, North Dakota, and South Dakota set about following the process and developing interdisciplinary curriculum chunks. The schools differed in many respects: one school was on an Indian reservation, two were from an urban city, one was a magnet school for technology, another was a regional vocational school, there was a school from the Colorado mountains, a rural school from Missouri and a high school from a middle sized city in North Dakota that houses only grades 11 and 12. Some of these teachers had worked together previously, but several teams scarcely knew each other. One team included a first year teacher. The content areas these teachers represented included math, science, English, and social studies. In addition, there were also teachers representing music, early childhood education, technology, and business communications. In two, one-week sessions, separated by three weeks, these teacher teams developed three chunks for possible use. They planned to implement at least one of them in the fall. These teachers faced many issues that hamper efforts to change or restructure a school that is already operating. Since last summer, additional chunks have been written by elementary and middle school teachers and some additional high school teachers.

Chunk development rests on the foundation of good instructional practices as an environment that enhances interdisciplinary teaching. To be successful in developing and implementing interdisciplinary curriculum it is important for students to have ownership of their learning. They need to be motivated by the "real world" nature of the theme, problem or issue that is at the center of the process. Under this approach to curriculum the student also must realize that there is an interaction and integration of the content areas included within the chunk. Teachers need to jointly create an instructional environment that becomes the basis for the delivery of the interdisciplinary curriculum. As students and teachers move from meta-disciplinary to interdisciplinary to transdisciplinary curriculum it is possible to give students a larger stake in the development of the chunk before its application. It is important also to remember that nothing is written in stone. Student questions or confusions may cause changes to occur to any part of the chunk during its implementation. Teachers may wish to use their chunks in future years and the chunks will need to be revised as they are implemented and problems or concerns arise.

Interdisciplinary Chunk

Sector Graphic



Having established the instructional environment and behavior setting for students and teachers, there are two other essentials that must be considered. Content standards, from the content areas involved, are the first important consideration. Each content area that is a part of the chunk must have at least one of its content standards integrated into the chunk design. If the teachers involved come from schools or districts that have lifelong learner standards in addition to content standards, one or more of these also needs to be considered. It is especially important to include

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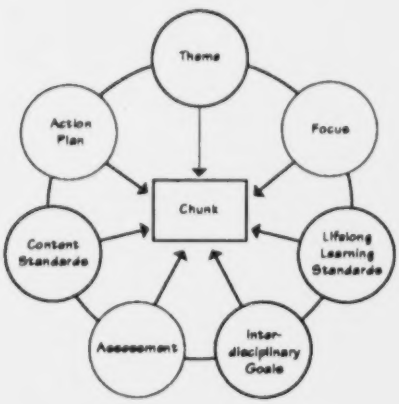
complex thinker standards if the school or district has them. There are fifteen different types of complex reasoning skills that students could learn to use. Teachers need a clear understanding of how to differentiate among these and if there are local or state standards pertaining to these complex thinking criteria, they need to be applied in the interdisciplinary curriculum. The third component that is vital to the process is assessment. For classroom use multiple validations are recommended. In the chunk design a strong emphasis is placed on developing performance based tasks and assessments. To help students it is strongly suggested that both formative and summative tasks and assessments are part of the multiple validations.

Interdisciplinary Chunk

Network Graphic



The chunk process rests on the three components mentioned above: (1) learner-centered principles; (2) content and learner standards; and (3) assessment. The Theme is the organizing center of the chunk. Theme is more generic than the specific focus, issue, or problem that is a narrowing of the Theme. In the chunk design, Focus includes the narrowing of the Theme to a specific aspect, issue or problem related to it. This provides the potential for teachers to have more than one chunk on a theme that explores different aspects of the Theme. Some teachers are using one theme for the entire year. They are breaking the year into several chunks; each is a unique problem, issue or focus related to the Theme. In Missouri, a group of teachers selected human values for their Theme. They then wrote chunks dealing with a simulated society, ancient civilizations and medieval societies all related to the overall Theme of human values.

The Action Plan is the description of what will be taught during the four to six weeks of the chunk. It includes: the purpose of the chunk, the relationship to learner-centered principles as a measure of the instructional environment, the specific content standards and, if appropriate, learner standards. The Action Plan contains formative performance tasks in each of the included disciplines as a way of assessing specific discipline content standards or benchmarks. In addition, interdisciplinary goals for the overall chunk need to be developed and assessed through a culminating summative performance task. These tasks all need to have specific task-related rubrics developed. A calendar of activities, a list of resources and a narrative of the activities and events that will take place is also included in the action plan.

The McREL process authors have provided a planner that helps teachers in working through the development of the Action Plan. The planner has segments for all of the sections of the Action Plan that are essential for writing a successful chunk. The document that is developed with the use of the planner serves as a road map throughout the process when the curriculum is being implemented. The development of this document allows teachers to tailor the chunk to meet the needs of individuals and the specific group of learners targeted. The chunk document provides a clear delineation of the task specific and general skills and procedures called for to reach the standards selected. (Grady, Kreuger, Fanning, Whisler and Barlow, 1993)

The chunk serves as a bridge from the school house to real life for the students. It is important to remember that interdisciplinary curriculum must connect to the school or district graduation requirements. It must also use the school or district's standards. The expectation of high level performance is basic to the interdisciplinary concept. The assessment portion of the chunk document helps to validate the performance level. To succeed in setting up an interdisciplinary program, the school, teachers and administrators must win the support of administration, parents and community. It is important to clearly delineate the content standards the students will achieve and the knowledge and skills that the students will demonstrate to show their success in the interdisciplinary curriculum. Administrative support as well as that of parents and community is essential for success and teachers must be clear about what students will do and how they will be assessed.

After the chunks had been completed, revised and discussed endlessly, four of the schools in our pilot group carried out a chunk in the fall semester of the 1993-94 school year. All students involved in the chunks completed a questionnaire at the end of the four to six weeks' chunk. Some schools gave both pre and post-chunk questionnaires. All schools gave the same questionnaire to randomly selected students at the same grade level who were not involved in the interdisciplinary teaching and learning process. While there were not significant differences between the two groups of students for some responses, there were statistically significant differences between the groups of students for the following items:

- I enjoy participating in summative tasks as a demonstration of my learning.
- I know what a performance-based task is.
- I participate in information gathering.
- I am competent as a quality producer.

Subsequent statistical analysis suggested powerful trends for a number of other items including:

- My teachers know how to teach.
- My teachers are also learners.
- I feel that I have the basic knowledge, skills and preparation for this course.

Teachers also completed a questionnaire about their feelings and reactions to the chunk experience. Their responses were placed on a Likert scale, the scale was 1.0 - 6.0. A 6.0 would be the maximum high score. The following items scored significantly high for the entire group of fifteen teachers who actually implemented chunks and completed the teacher questionnaire:

- 5.93 — Learning should be assessed in a variety of ways.
- 5.6 — Transdisciplinary curriculum is important.
- 5.67 — Curriculum should address both knowledge and skills objectives.

Interestingly, some items scored very low. Two of these are worth mentioning:

- 3.71 — Budget decisions in this school are driven by learning and instructional priorities.
- 3.79 — Clear, agreed upon instructional objectives exist across grades and subjects at this school. (Jesse & Grady, 1994)

At the time of implementation, unexpected issues surface such as teaching styles, student-teacher relationships, and willingness to let students approach the curriculum in a learner-centered environment. Flexibility, a sense of humor, an understanding of when to lead and when to follow will all contribute to a successful interdisciplinary venture. The opportunity to make a significant move toward restructuring schools is available through the implementation of interdisciplinary curriculum.

Bibliography

Caine, G. and Caine, R.N. (1991). *Making Connections: Teaching and the Human Brain.* Alexandria, Virginia: Association for Supervision and Curriculum Development.

Drake, Susan M. (1993). *Planning Integrated Curriculum: The Call to Adventure.* Alexandria, Virginia: Association for Supervision and Curriculum Development.

Gardner, H. and Boix-Mansilla, V. (1994). Teaching for Understanding — Within and Across the Disciplines. *Educational Leadership.* 51, 5:14-18.

Grady, J.B., Kreuger, A., Fanning, J., Whisler, J., Jesse, D., and Barlow, T. (1993). *A Process for the Development of Transdisciplinary Curriculum based on Learner-Centered Principles.* Unpublished manuscript available from the Mid-continent Regional Educational Laboratory, Aurora, Colorado.

Grady, J.B., Kreuger, A., Whisler, J. and Fanning, J. (1993). *Integrated Interdisciplinary Curriculum Development Model.* Unpublished manuscript available from the Mid-continent Regional Educational Laboratory, Aurora, Colorado.

Jacobs, H. H. (1989). *Interdisciplinary Curriculum: Design and Implementation.* Alexandria, Virginia: Association for Supervision and Curriculum Development.

Jesse, D. and Grady, J.B. (1994). *A Preliminary Evaluation of the Great Plains Alliance Interdisciplinary Curriculum Project.* Unpublished manuscript: Available from the Mid-continent Regional Educational Laboratory, Aurora, Colorado.

Kendall, J. and Marzano, B. (1994). *The Systemic Identification and Articulation of Content Standards and Benchmarks: Update.* Aurora, Colorado: Mid-continent Regional Educational Laboratory.

Klein, J.T. (1990). *Interdisciplinarity: History, Theory and Practice.* Detroit: Wayne State University Press.

Kohl, H. (1982). *Basic Skills: A Plan for Your Child, A Program for All Children.* Boston: Little, Brown and Company.

McCombs, B. et al. (1993). *Learner-centered psychological principles: Guidelines for school redesign and reform.* Aurora, Colorado: Mid-continent Regional Educational Laboratory.

McMurry, C.A. (1920). *Teaching by Projects.* New York: The Macmillan Company.

Meeth, L. R. (1978). Interdisciplinary Studies: Integration of Knowledge and Experience. *Change.*10:10.

Tschudi, S. (1991). *Travels Across the Curriculum.* New York: Scholastic, Inc.

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